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Locative Plural Forms in Classical Sanskrit

Belinda L. Brodie
The Ohio State University

1. Introduction

In this paper, I will discuss juncture phenomena involving the locative plural case-ending in Classical Sanskrit. Alternative analyses will be presented and each analysis will be evaluated according to a model based on the Interface Model of Pullum and Zwicky (to appear). In this model, the grammar consists of a set of autonomous, interfacing, ordered components. The interface between the autonomous components is constrained so that a component may have access to the output of the previous component, but not to the input of that or any other component. The components are ordered with respect to one another, thus predicting that a rule of a component may feed or bleed, but not counterfeed or counterbleed, a rule of a following component.

Each component has as its input the output of the component ordered immediately before it. The type of structure serving as the input of a component will determine the types of domains over which the rules of the component may apply, as well as the types of conditions on the application of the rules that may obtain. In this model, the syntactic component feeds a component of cliticization rules, which then feeds the morphological component. The morphological component has access to surface syntactic structure after the rules of the cliticization component have applied. The domain of morphological rules is morpho-syntactic. The rules have morpheme-, word-, or (syntactic) phrase-level domains and may exhibit syntactic or morphological conditioning on their application. The morphological component consists of three subcomponents: the component of morpholexical rules (also known as allomorphy or morphological spell-out rules), the component of word-formation rules, and the component of morphophonemic rules. The output of the morphological component is a morpho-syntactic structure. Readjustment rules, ordered after the morphological component and before the phonological component, change this structure into one which expresses the domains relevant to the phonological component--syllable, phonological word, and phonological phrase. The phonological component consists of "processes", or automatic rules. In this model, the rules of the morphological component apply cyclically; then, after restructuring, the processes of the phonological component apply cyclically.

Throughout this paper, it will be assumed that boundary symbols do not play any role in the grammar and that the applicability of rules at particular junctures is determined solely by structural considerations (cf. Rotenberg 1978). For the sake of convenience, I will use the terms "word boundary" and "morpheme boundary", but they are to be understood as referring to particular structural configurations. I will refer to a "word boundary" between two lexical items if they are not immediately dominated by the same word-level lexical category node, and to a "morpheme boundary" between two lexical items if they are immediately dominated by the same word-level lexical category node. Along the lines of Rotenberg (1978), I

will assume that the rules of each component are divided into subcomponents depending on their domains of application. Thus, the component of morphophonemic rules is further divided into three subcomponents: one consisting of morpheme-level rules, one consisting of word-level rules, and one consisting of phrase-level rules. The processes of the phonological component are divided into at least three components: one consisting of syllable-level processes, one consisting of (phonological) word-level processes, and one consisting of (phonological) phrase-level processes.

2. "Pāda" endings

In Classical Sanskrit, the seven case-endings in (1) have traditionally been termed "pāda" or "word" endings, because morphophonemic rules apply to stems and "pāda" endings as though they were separate words. Rules which apply between words (external sandhi rules) also apply between stems and their pāda endings. Rules which apply word-finally also apply stem-finally when the stem is followed by a pāda ending. The rule in (2), for example, applies between words, as in (3), and also between stems and pāda endings, as in (4).

(1)

bhyām	instrumental dual	bhis	instrumental plural
bhyăm	dative dual	bhyas	dative plural
bhyām	ablative dual	bhyas	ablative plural
		su	locative plural

(2) $as \rightarrow o \;/\; \_\_\_\_ \;\#\# \begin{bmatrix} +voi \\ +cons \end{bmatrix}$

(3) /manas devasya/ → mano devasya
'mind' 'god'
nom. sg. / gen. sg.

(4) /manas--bhis/ → manobhis
'mind' instr. pl.

An adequate analysis of stems and pāda endings must account for the generalizations in (5) and (6).

(5) Rules which apply between words also apply between stems and their pāda endings.

(6) Rules which apply word-finally also apply stem-finally when the stem is followed by a pāda ending.

These generalizations can easily be accounted for by an analysis in which stems and their pāda endings are separated by a word boundary. Such an analysis would be adequate for any forms consisting of a stem and one of the six "pāda" endings beginning with bh, but seemingly inadequate for some locative plural forms. In some locative plural forms, a word-internal rule, the RUKI rule, has apparently applied across the juncture between the stem and ending. If the stem and ending were separated by a word boundary we would not expect the strictly word-internal RUKI rule to apply. It should be noted that the only forms which are problematic for an analysis in which stems and pāda endings are separated by a word boundary are those

in which the RUKI rule has apparently applied. There are no cases in which an external sandhi rule or word-final rule fails to apply to the stem and ending as though separated by a word boundary. Even in the cases in which the RUKI rule has applied across the juncture between the stem and ending, external sandhi rules still apply to the stem and ending as though separated by a word boundary. Since the only problematic forms are locative plural forms, I will proceed by discussing the various types of locative plural forms and then consider alternative analyses of these forms.

3. Locative plural forms

The first type of locative plural forms which will be discussed are those which are not problematic for an analysis in which stems and the locative plural ending are separated by a word boundary. These forms can be derived by independently motivated rules if the stems are separated from the locative plural ending by a word boundary. Stems which fall into this category include some root consonant stems and some derived consonant stems.

The stem dviṣ will serve as an example of a root consonant stem of this category. The nominative singular, instrumental plural, and locative plural forms of dviṣ are given in (7). The nominative singular form is accounted for by the rule in (7a). The instrumental plural form is accounted for by (7a) and an independently motivated rule of regressive voicing assimilation. The locative plural forms would be accounted for by (7a) if we assume that the stem and ending are separated by a word boundary. Assuming that a word boundary separates the stem and ending explains why the word-internal rule in (7b), which applies across morpheme boundaries as in examples (8) and (9), does not apply to /dviṣ-su/. If the juncture between dviṣ and su were a morpheme boundary, instead of a word boundary, we would expect *dvikṣu, not dviṭsu. To block the derivation of *dvikṣu and to derive dviṭsu without positing any rules which are not independently motivated, it is crucial that dviṣ and su be separated by a word boundary, rather than a morpheme boundary, at least throughout part of the derivation.

(7) dviṣ 'enemy':

dviṭ	nominative sg.	a. ṣ → ṭ / ____##
dviḍ-bhis	instrumental pl.	b. ṣ → k / ____+ s
dviṭ-su	locative pl.	

(8) /dviṣ + si/ dvekṣi

(9) /dviṣ + sya + mi/ dvekṣyāmi

The stem manas, declined as in (10), is a derived consonant stem. The instrumental plural form results from the application of the external sandhi rule in (10a). The variant locative plural forms can be derived by independently motivated phrase level rules. I will not attempt to formulate the rule or rules, but it should be clear from (10b) that if the stem and ending are separated by a word boundary, then some phrase level rule or rules would apply to give the two locative plural forms.[1] If manas and su were separated by a morpheme boundary throughout the derivation,

then it would be necessary to introduce a rule which optionally changes morpheme-final s to ḥ, which Whitney (1889:sec. 67) defines as "a voiceless h-sound uttered in the articulating position of the preceding vowel." However, this rule would be limited to morpheme-final s's before the locative plural ending, since, as in (11), other morpheme-final s's do not undergo such a rule. Thus, to derive the two locative plural forms of manas without adding an unmotivated rule to the grammar, it is necessary that the stem and ending be separated by a word boundary, at least throughout part of the derivation.

(10) manas 'mind':

manas	nominative sg.
mano-bhis	instrumental pl.
manas-su or manaḥ-su	locative pl.

a. as → o / ____ ## $\begin{bmatrix} +\text{voi} \\ +\text{cons} \end{bmatrix}$

b. Before an initial s, ṣ, or ś, s is either assimilated, becoming the same sibilant, or it is changed into ḥ (visarga). (Whitney 1889:sec. 172)

e.g. manuḥ svayam or manus svayam
indraḥ śūraḥ or indraś śūraḥ
tāḥ ṣaṭ or tāṣ ṣaṭ

(11) /vas + sya + ti/ → vatsyati not *vaḥsyati

Other locative plural forms exhibit juncture phenomena identical to that which occurs word-internally between morphemes. If the stems and endings are separated by a morpheme boundary, these locative plural forms can be derived by independently motivated word level rules which apply between morphemes. The stems which fall into this category include some of the consonant stems and all vowel stems.

In examples of this type, the "RUKI" rule plays a crucial role. The RUKI rule is a word-internal rule which retroflexes an s when it is immediately preceded by "ruki" (i.e. r, syllabic r, k, or any vowel other than a or a:), unless the s is followed by an r. O'Bryan (1974) argued that the RUKI rule should be formalized with a morpheme boundary between the conditioning environment and the s. Such a formalization eliminates apparent exceptions to the rule, such as kusuma 'flower', in which no morpheme boundary exists between the non-retroflexed s and the conditioning element. She claimed that some surface ṣ's are derived from underlying ṣ's. The existence of underlying ṣ's in roots such as kaṣ 'scratch' is supported by forms in which the ṣ in a root is maintained even when an r follows. Kiparsky (1973) used the RUKI rule to support his claim that nonautomatic neutralization processes apply only to derived forms. He accounted for the cases covered by O'Bryan's rule as well as cases in which the retroflexed s is preceded by a "phonologically" derived RUKI (eg. siṣṭa from /sas + ta/) with a rule which retroflexes s after "ruki" in 'derived environments'. Hock (1979) claimed that Kiparsky's analysis does not account for all instances of ṣ predictably derived from underlying s, and amended Kiparsky's rule as in (12).

(12) s → ṣ / ruki ____

i) in non-roots
ii) root-finally in 'derived environments'
iii) root-initially after reduplication (with lexical and/or morphological restrictions)

This statement of the rule still eliminates the apparent exceptions that O'Bryan accounted for by her statement of the rule, because the exceptions are all within roots in nonderived environments. Zwicky (1970, and to appear) discusses the possibility that there is a process that retroflexes s after k and a rule which retroflexes s after the other conditioning elements. For the purposes of this paper, I will assume that the RUKI rule applies under the conditions given by Hock, and that at least for "rui" it is a morphophonemic rule, not a process.

In the derivation of the locative plural form vāk-ṣu, the RUKI rule has apparently applied to the s of su. For the RUKI rule to have applied, it is necessary that the stem and su be separated by a morpheme boundary, not a word boundary, at least at the point in the derivation when the RUKI rule applies. The locative plural form could be derived either by the application of the rule in (13a), followed by restructuring and the application of the RUKI rule, or by (13b) followed by the RUKI rule. Both (13a) and (13b) are independently motivated. The nominative singular form results from the application of rule (13a). The instrumental plural form results from the application of (13a) and the rule of regressive voicing assimilation mentioned earlier.

(13) vāc 'speech, word':
vāk nominative sg.
vāg-bhis instrumental pl.
vāk-ṣu locative pl.

a. c → k / ____ ##

b. c → k / ____ + s

The stem diś is declined as in (14). This stem is one of four stems with final ś which exhibit alternations of the stem-final ś with k when the ś is word-final. All other stems ending in ś follow the external sandhi rule in (15). No historical or synchronic evidence suggests analyzing the four exceptional stems as having anything other than stem-final ś underlyingly. One way of accounting for the nominative singular form is to posit the word level morpholexical rule in (14a). The locative plural form could be derived by application of the independently motivated rule in (14b), followed by the application of the RUKI rule or by application of the morpholexical rule in (14a), restructuring, and then the RUKI rule.

(14) diś 'direction':
dik nominative sg.
dig-bhis instrumental pl.
dik-ṣu locative pl.

a. word-level morpholexical rule:
morpheme # x: /dik/ before a word boundary
/diś/ elsewhere

b. ś → k /____+ s

(15) ṣ, ś -> ṭ /____##

The only rule which applies in the derivations of locative plurals formed from stems ending in vowels is the RUKI rule. Thus, these forms could be derived if the stems and the locative plural marker are separated by a morpheme boundary throughout derivations.

In other locative plural forms, the word-internal RUKI rule apparently applies across the juncture between the stem and ending, but an external sandhi rule also applies at this juncture. The stems that fall into this category are the derived consonant stems ending in is and us. The stem havis, for example, is declined as in (16). The locative plural forms seem to have undergone the phrase level rules or processes in (16a) as well as the RUKI rule. The locative plural forms could be derived as shown in (17). All of the rules or processes which have applied in the derivation are independently motivated, assuming that the RUKI rule applies despite the intervening visarga. Whitney (1889:sec. 183) states that the RUKI rule applies "in the initial s of an ending after the final s of a stem, whether the latter be regarded as also changed to s or as converted into visarga." However, all of the examples of the RUKI rule which apply despite an intervening visarga involve the locative plural ending; s's before other s-initial endings, such as the future ending, do not become visarga, so that there are no other comparable cases, and it is not possible to find independent motivation for the claim that the RUKI rule applies despite an intervening visarga.[2]

(16) havis 'oblation':

havis	nominative sg.
havirbhis	instrumental pl.
haviḥṣu or haviṣṣu	locative plural

a. Before an initial s, ṣ, or ś, s is either assimilated, becoming the same sibilant, or it is changed into ḥ (visarga). (Whitney sec. 172)

4. Alternative analyses

In this section, I will discuss analyses of the locative plural forms which are compatible with the Interface Model outlined earlier. First, I will consider analyses which are in accord with the assumption that all occurrences of ṣu are predictable by the RUKI rule.

In (17) are given the derivations for the locative plural forms of havis in which the occurrence of ṣu is predictable by the RUKI rule and only independently motivated rules are employed. Note that any analysis which treats all cases of ṣu as predictable by the RUKI rule will require that the RUKI rule be formulated as applying across ḥ (visarga).

(17) /havis##su/ Rule (16a)
havis##su or haviḥ##su Restructuring
havis+su or haviḥ+su RUKI rule
haviṣ+su or haviḥ+ṣu Progressive Retroflex Assimilation
haviṣ+ṣu

It is necessary to determine when in this derivation restructuring occurs. If rule (16a) includes a phrase-level rule or rules, then restructuring is occurring within the morphological component between the subcomponent of phrase-level rules and the subcomponent of word-level rules. Such a derivation is inconsistent with any model, including the Interface Model, which assumes cyclic application of rules, since a phrase-level rule (rule (16a)) is feeding a word-level rule (the RUKI rule). If rule (16a) includes a phrase-level process, then the restructuring is occurring between the phonological component and the morphological component, and a process is feeding a rule. Such a derivation is inconsistent with the Interface Model and any other theory which claims that rules precedes processes. Ordering rules before processes makes the prediction that a phonological process may be in a counterfeeding or counterbleeding, but not a feeding or bleeding, relationship with a morphological rule. If rule (16a) includes a process, then it is in a feeding relationship with a rule (the RUKI rule), and the derivation is inconsistent with a "rules before processes" model.

Thus, whether rule (16a) is a process or rule (or a combination of the two) the derivation in (17) is inconsistent with the Interface Model. It is clear that the only type of derivation of the locative plural of havis compatible with the Interface Model is one in which neither a process nor a phrase-level rule feeds the RUKI rule. For this to be the case, the rule which changes the stem-final s to visarga would then have to be a rule, rather than a process, and word-level, rather than phrase-level. The rule in (16) which optionally changes s to visarga when followed by the locative plural ending would be required. (As noted earlier, s does not become visarga before other s-initial suffixes.)

(18) s → ḥ /____+locative plural marker

In the derivation in (19), rules are preceding processes and no higher-level rules or processes are feeding lower-level rules or processes. This derivation is, I believe, the only reasonable derivation which is consistent with the Interface Model and the assumption that all instances of su are derived by the RUKI rule.

(19) /havis+su/ Rule (16) (optional word-level rule)
havis+su or haviḥ+su RUKI rule (word-level rule)
haviṣ+su or haviḥ+ṣu Progressive Retroflex Assimilation (word-level process)
haviṣ+ṣu

All vowel stems, some consonant stems, and stems ending in as, such as manas, can be derived in the same manner as the forms of havis without any further complication. In order to derive consonant stems ending in ṣ or ś, it will be necessaary to introduce a rule which changes ṣ or ś to ṭ word-internally before the locative plural ending, as in (20). This rule

must bleed the rule in (21).

(20) ṣ, ś → ṭ /___+locative plural marker

(21) ṣ, ś → k /___+ s

Thus, if we are to derive locative plural forms in such a manner that all occurrences of ṣu result from the application of the RUKI rule, then it will be necessary to adopt two otherwise unmotivated morphophonemic rules (rules (18) and (20)). More important, an analysis in which stems and locative plural endings are separated by a morpheme boundary fails to capture the generalizations in (22) and (23), special cases of (5) and (6).

(22) Rules which apply between words also apply between stems and the locative plural ending.

(23) Rules which apply word-finally also apply stem-finally when the stem is followed by the locative plural ending.

In order to capture these generalizations, it is necessary to claim that a word boundary exists between stems and the locative plural ending. If it is assumed that a word-level lexical category node (Post-Position) immediately dominates the locative plural ending, and other pāda endings, a word boundary, as defined previously, exists between stems and their pāda endings, since the stems and pāda endings are not immediately dominated by the same lexical category node. An analysis in which pāda endings are analyzed as Post-Positions captures the generalizations in (22) and (23), as well as the broader generalizations in (5) and (6).

If such an analysis is adopted, the retroflexed s in forms such as haviḥṣu cannot be derived by the RUKI rule, since the RUKI rule does not apply across word boundaries. In order to derive haviḥṣu without adding an ad hoc rule which retroflexes the s across word boundaries just in these forms, it is necessary to posit ṣu underlyingly for these stems.

The claim that for some stems the underlying form of the locative plural ending is ṣu is supported by historical evidence. In Vedic, the RUKI rule applied variably across word boundaries, as well as word-internally. Even though the rule applied variably word-externally, Hock (1979:51) notes that "If we except certain apparent systematic exceptions ... we find that at least some instances of RUKI are found even in the least likely environments." Whitney (1889:sec. 188) cites the examples in (24) in which the RUKI rule has applied across word boundaries despite an intervening word-final visarga.

(24) yájuḥ ṣkannám
agníḥ ṣṭave
nákiḥ ṣáh

It is reasonable to assume that in Vedic locative plural forms of is and us stems were derived as in (25), and that, as the RUKI rule became nonproductive word-externally, the form of the locative plural ending for these stems was lexicalized as in (26).

(25) havis##su s → ḥ /___##
havih##su RUKI rule (word-external in Vedic)
haviḥ##ṣu

(26) locative plural marker: ṣu when the stem is one of the following: #x, #y, ...
su elsewhere

I have stated the distribution of the allomorphs of the locative plural ending in terms of individual stems for two reasons. First of all, I have found no other reason for identifying is and us stems as belonging to a morphological class separate from other stems. These stems are apparently in the same declension class as as stems, but as stems have the locative plural form su, not ṣu. Second, there are very few stems ending in is or us. Whitney (1889:sec. 412) states that "the stems in as are quite numerous, and mostly made with the suffix as ...; the others are few, and almost all made with the suffixes is and us." Because there are so few is and us stems, it seems reasonable to posit a morpholexical rule which refers to individual stems.

Assuming that a word-level process retroflexes s after k, it is not necessary to posit underlying ṣu for forms such as dikṣu and vākṣu. Forms such as dikṣu can be derived as in (27) by application of the morpholexical rule mentioned earlier, followed by restructuring between the morphological and phonological components and application of the process which retroflexes s after k. Forms such as vākṣu can be derived in the same way, as in (28).

(27) dik##su restructuring
dik+su s → ṣ /k___
dik+ṣu

(28) vāc##su c → k /___##
vāk##su restructuring
vāk+su s → ṣ /k___
vāk+ṣu

The locative plural forms of all stems ending in consonants can be derived by independently motivated rules with the same steps in their derivations as for vākṣu and dikṣu.[3] The locative plural forms of stems in as will be derived as in (29). The forms of is and us stems will be derived as in (30).

(29) manas##su Rule (16a)
manaḥ##su or manas##su restructuring
manaḥ+su or manas+su no processes apply

(30) havis##ṣu Rule (16a)
haviḥ##ṣu or haviṣ##ṣu no processes apply

It is doubtful that locative plural forms of stems ending in vowels should be derived in the same way. There is no motivation for separating vowel stems and pāda endings by a word boundary, rather than morpheme

boundary. Distinct treatments of consonant-stem and vowel-stem forms can be carried out if we assume that there is a morphological feature which distinguishes consonant stems from vowel stems. If such a feature can be motivated, then we can insure that the vowel stems are separated by a morpheme boundary, rather than a word boundary, by positing a rule of cliticization conditioned by the morphological feature distinguishing vowel stems from consonant stems.

4. Conclusion

In this paper, I have considered analyses of locative plural forms compatible with the Interface Model. It has been shown that an analysis in which all occurrences of ṣu are predictable by the RUKI rule will fail to capture the generalizations that rules which apply stem-finally before the locative plural ending are identical to rules which apply word-finally and rules which apply at the juncture between stems and endings are identical to rules which apply at the juncture between words. It has been shown that an analysis which does capture these generalizations must treat some instances of ṣu as lexicalized and seems to require distinct treatments of consonant and vowel stems.

Footnotes

*I wish to thank Brian Joseph, Adam King, and Arnold Zwicky for their comments on an earlier version of this paper.

[1]Kiparsky (1979:174) suggests that more general rules are applying here: "...we get a choice, before any voiceless consonant of either (preferably) ḥ, or else a fricative homorganic with the following consonant." One way of formalizing Whitney 172 is as an optional rule which changes s to ḥ word-finally before the voiceless consonants (except t and th) and a process which applies to word-final s's, assimilating them to a following fricative.

[2]Some verbal prefixes end in s (eg. dus, nis), but verb forms with verbal prefixes are probably best analyzed as having a word boundary between the prefix and root. An initial radical s after a prefix is not always treated the same as a stem-initial s (cf. Whitney (1889:sec. 185)).

[3]The locative plural forms of ir and ur stems, such as girṣu, are apparent exceptions to this analysis. Since the RUKI rule has apparently applied, it seems that there must be a morpheme boundary, not a word boundary, between these consonant stems and the ending when rules apply. However, if the ṣu is underlying, as for is and us stems, then they are no longer exceptional.

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